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Lee

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(54) **DIGITAL PHOTOGRAPHING APPARATUS THAT ADAPTIVELY DISPLAYS ICONS AND METHOD OF CONTROLLING THE DIGITAL PHOTOGRAPHING APPARATUS**

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(51) **Int. Cl.**
H04N 5/222 (2006.01)

(52) **U.S. Cl.** **348/333.02**

(58) **Field of Classification Search** 348/333.02
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,541,656	A *	7/1996	Kare et al.	348/333.02
6,310,648	B1 *	10/2001	Miller et al.	348/333.05
6,441,854	B2 *	8/2002	Fellegara et al.	348/333.13
2003/0090572	A1 *	5/2003	Belz et al.	348/207.1
2003/0090585	A1 *	5/2003	Anderson	348/333.11
2004/0119876	A1	6/2004	Ohmori et al.	
2004/0179123	A1 *	9/2004	Cazier	348/333.02
2004/0217984	A1 *	11/2004	Borden, IV	345/723
2005/0216862	A1 *	9/2005	Shinohara et al.	715/825
2006/0181630	A1 *	8/2006	Shioji et al.	348/333.01

FOREIGN PATENT DOCUMENTS

CN	1373595 A		10/2002
JP	11313229 A	*	11/1999
WO	WO 03/028364 A1		4/2003

OTHER PUBLICATIONS

Sony Corporation, "Online User Manual and Guide for Sony Cyber-Shot DSC-P92 Digital Camera," retrieved from website: http://www.fixya.com/support/p325603-sony_cyber_shot_dsc_p92_digital_camera/manual-15724 (Dec. 31, 2003).

* cited by examiner

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(57) **ABSTRACT**

Provided are a digital photographing apparatus that displays a preview image and overlaps setting icons indicating set operating conditions of the digital photographing apparatus and a method of controlling the digital photographing apparatus. If a user does not generate a signal within a set period of time, the setting icons are no longer displayed.

22 Claims, 10 Drawing Sheets

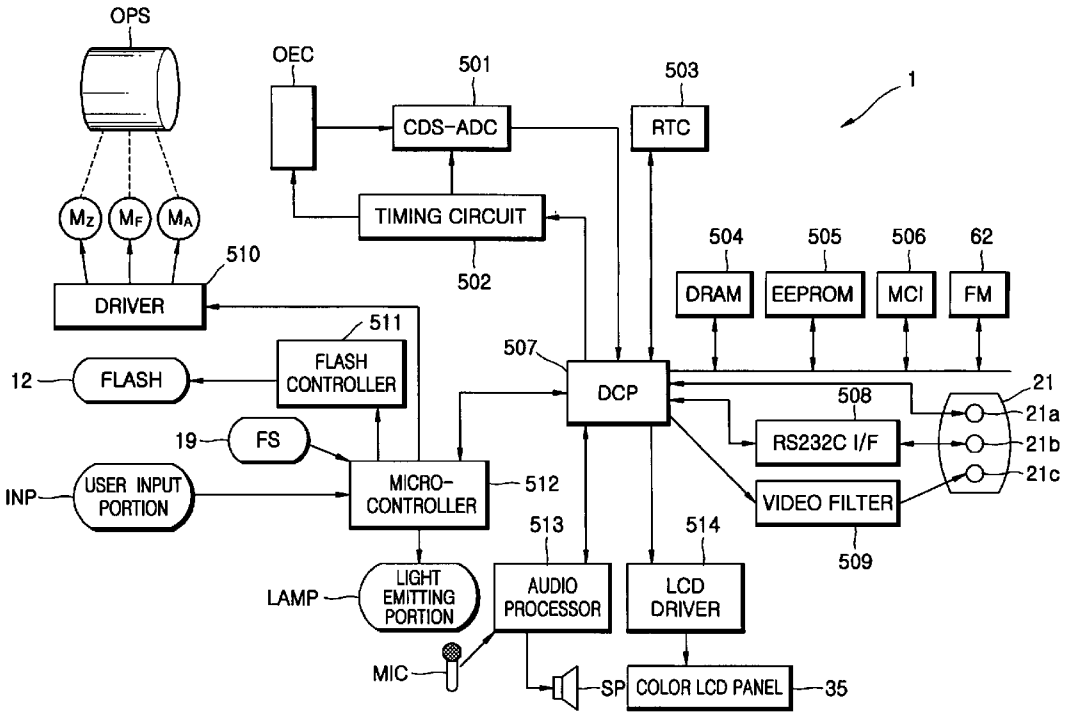


FIG. 1

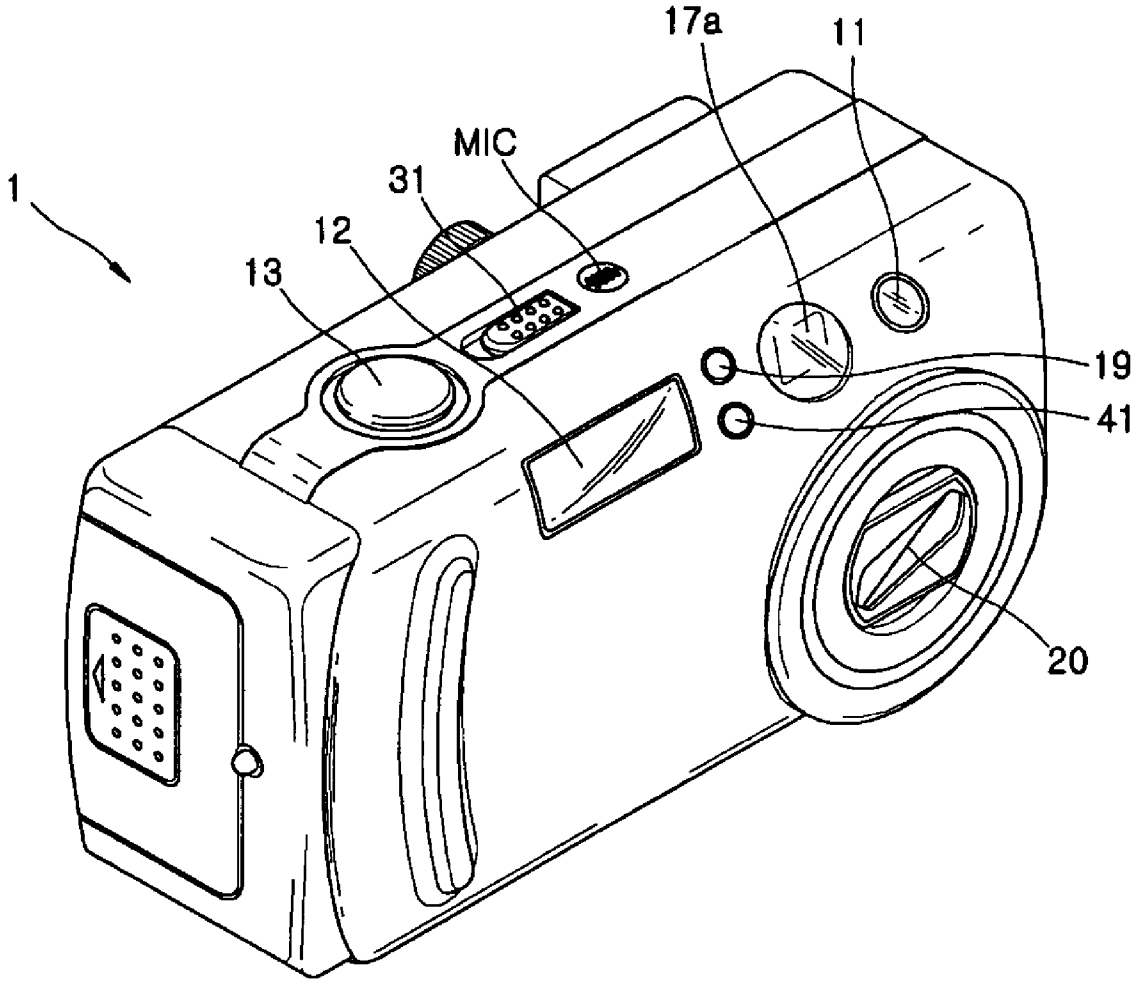


FIG. 2

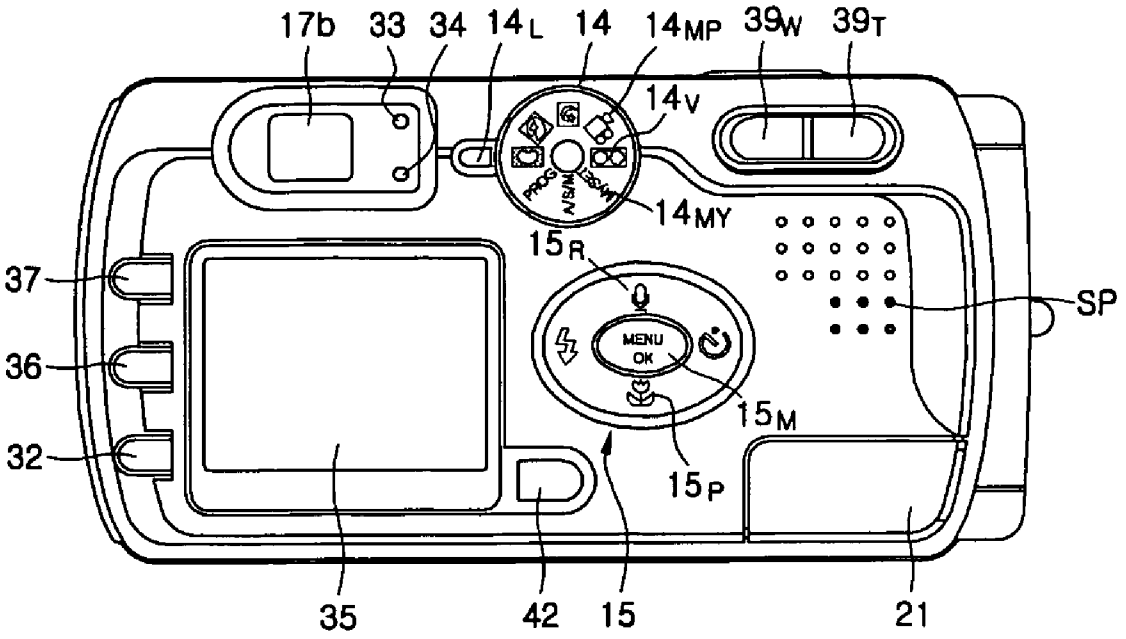

17b
33
34
14L
14
14MP
39W
39T
14V
14MY
15R
37
36
32
SP
MENU
OK
15M
15P
35
42
15
21

FIG. 3

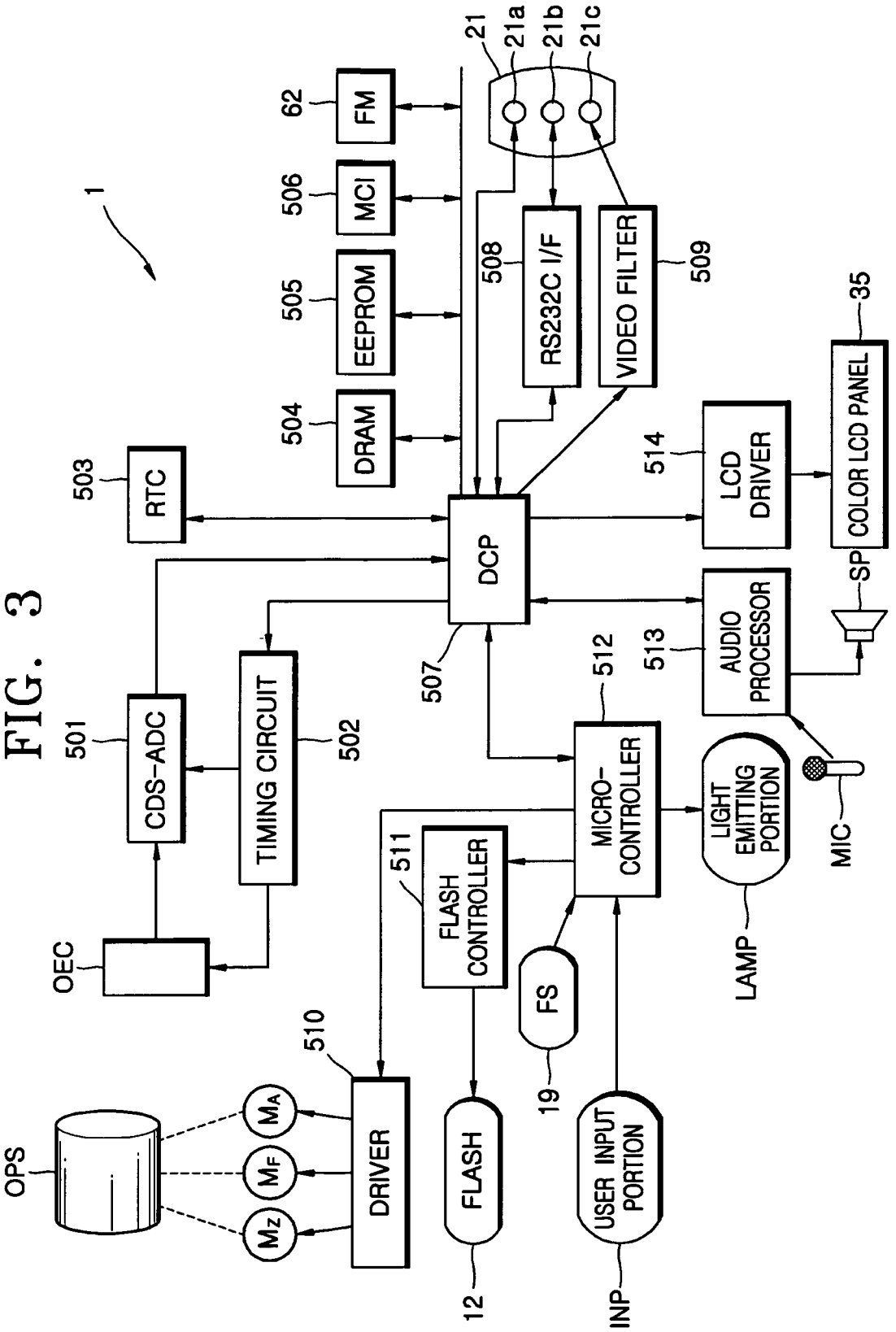

1
21
21a
21b
21c
62
FM
506
MCI
505
EEPROM
504
DRAM
503
RTC
508
RS232C I/F
509
VIDEO FILTER
514
LCD DRIVER
35
COLOR LCD PANEL
SP
DCP
507
512
513
AUDIO PROCESSOR
MIC
501
CDS-ADC
502
TIMING CIRCUIT
OEC
511
FLASH CONTROLLER
MICRO-CONTROLLER
LIGHT EMITTING PORTION
LAMP
510
DRIVER
FLASH
12
FS
19
USER INPUT PORTION
INP
OPS
MA
MF
MZ

FIG. 4

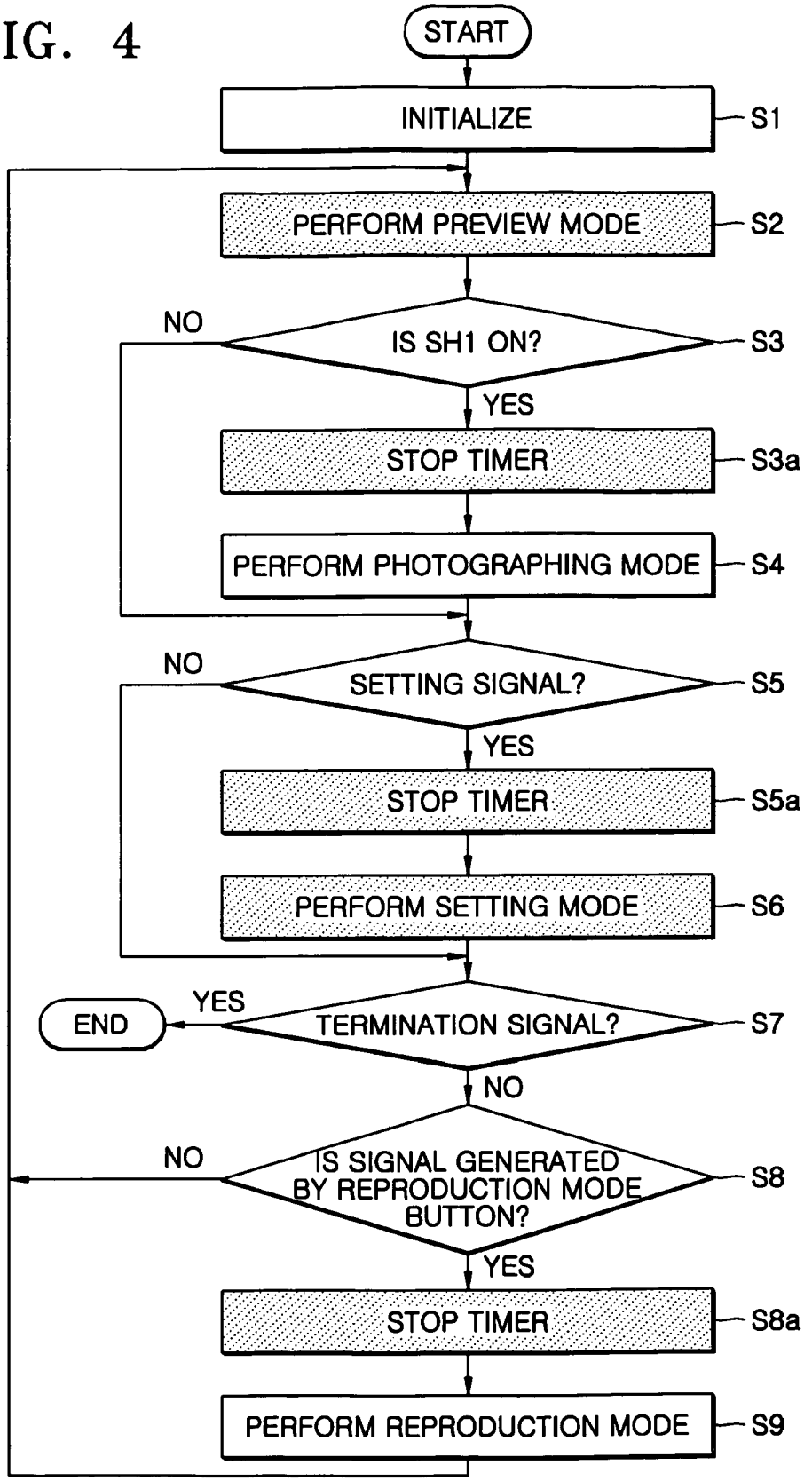

START
INITIALIZE
S1
PERFORM PREVIEW MODE
S2
NO
IS SH1 ON?
S3
YES
STOP TIMER
S3a
PERFORM PHOTOGRAPHING MODE
S4
NO
SETTING SIGNAL?
S5
YES
STOP TIMER
S5a
PERFORM SETTING MODE
S6
END
YES
TERMINATION SIGNAL?
S7
NO
NO
IS SIGNAL GENERATED BY REPRODUCTION MODE BUTTON?
S8
YES
STOP TIMER
S8a
PERFORM REPRODUCTION MODE
S9

FIG. 5

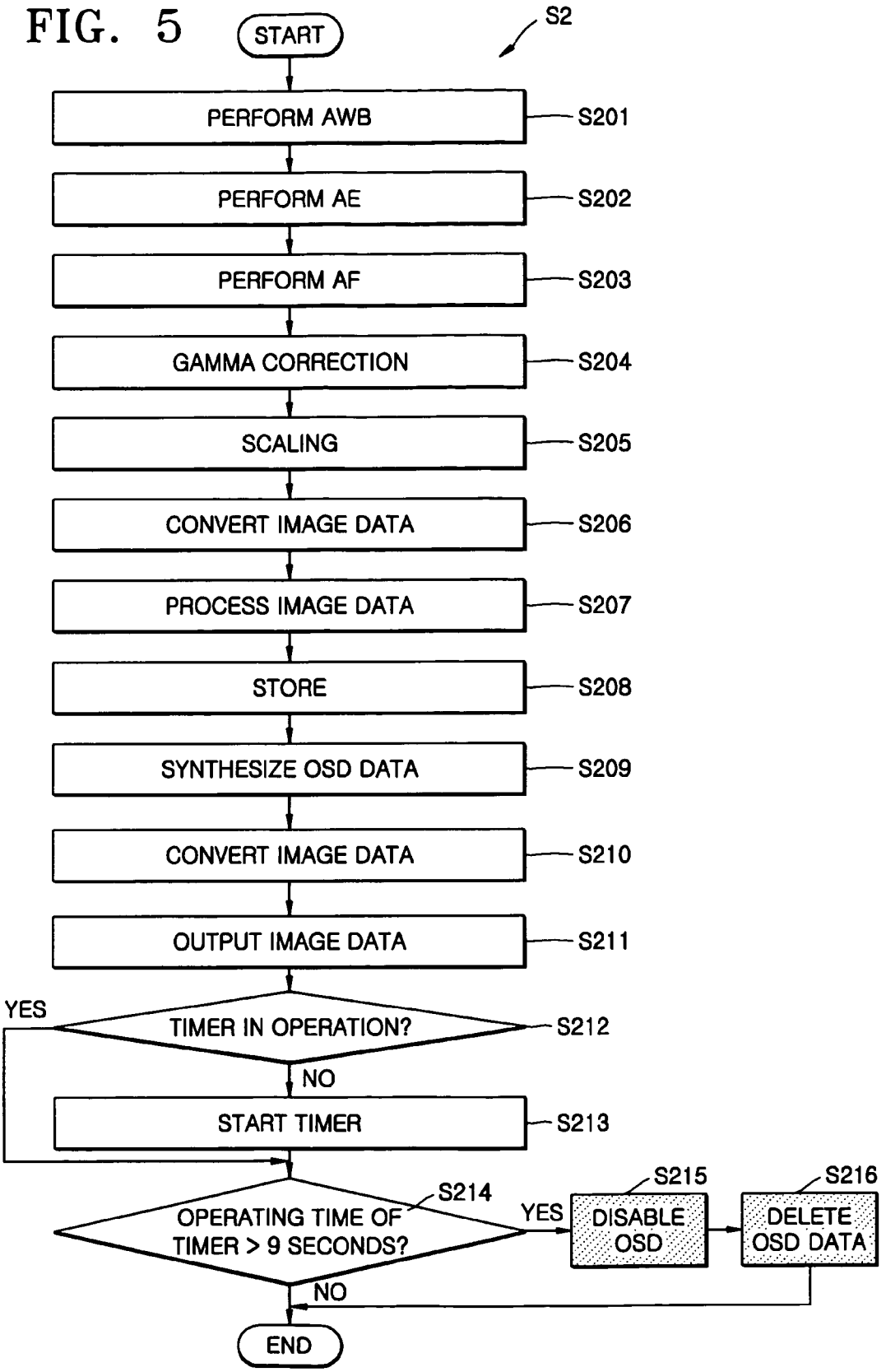

START
S2
PERFORM AWB
S201
PERFORM AE
S202
PERFORM AF
S203
GAMMA CORRECTION
S204
SCALING
S205
CONVERT IMAGE DATA
S206
PROCESS IMAGE DATA
S207
STORE
S208
SYNTHESIZE OSD DATA
S209
CONVERT IMAGE DATA
S210
OUTPUT IMAGE DATA
S211
YES
TIMER IN OPERATION?
S212
NO
START TIMER
S213
S214
OPERATING TIME OF TIMER > 9 SECONDS?
YES
S215
DISABLE OSD
S216
DELETE OSD DATA
NO
END

FIG. 6

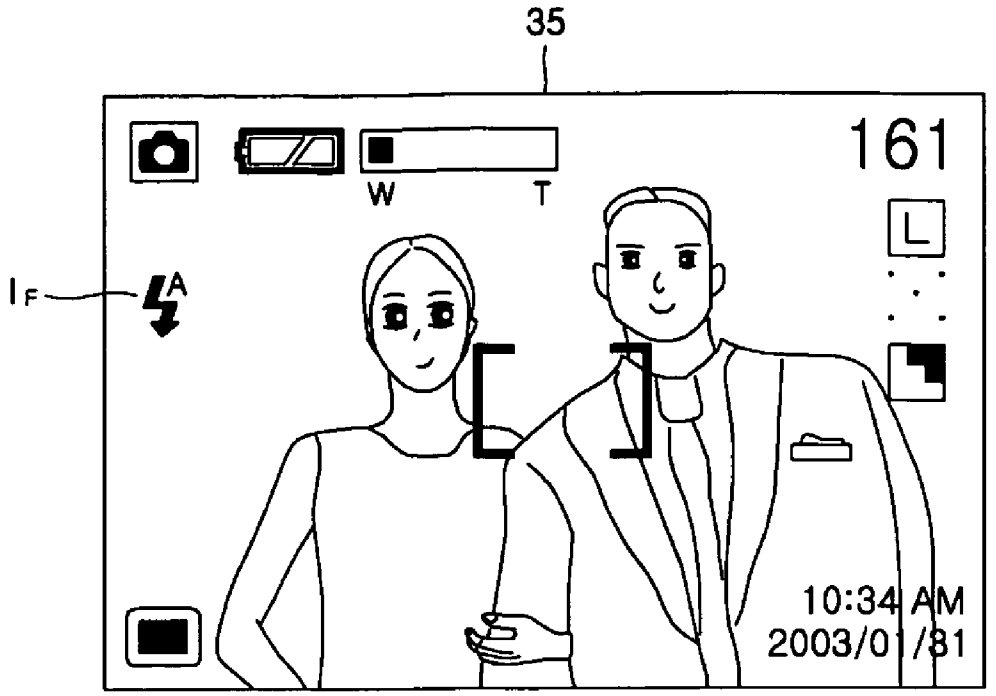


FIG. 7

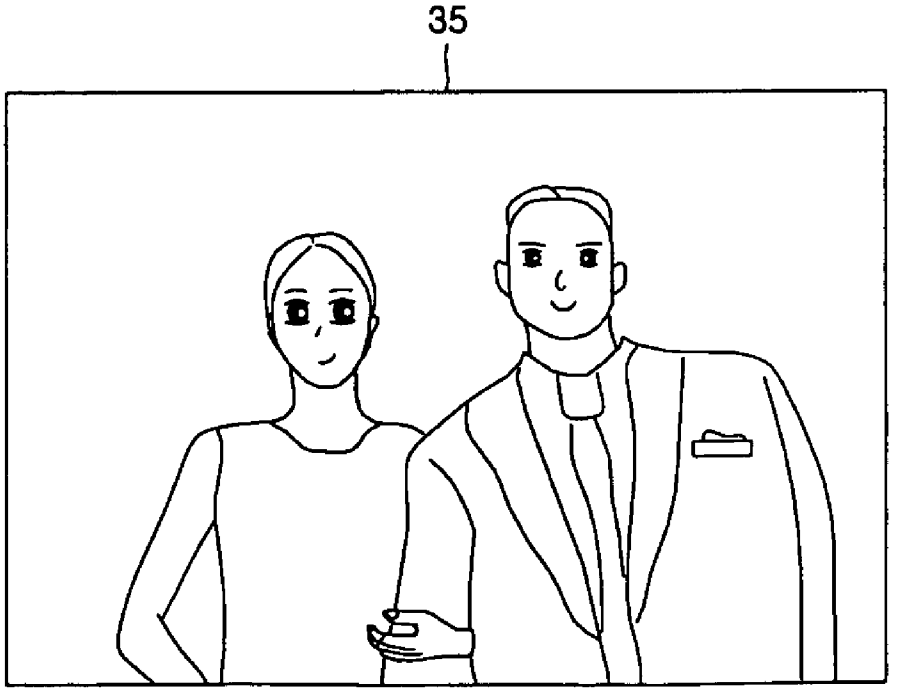


FIG. 8

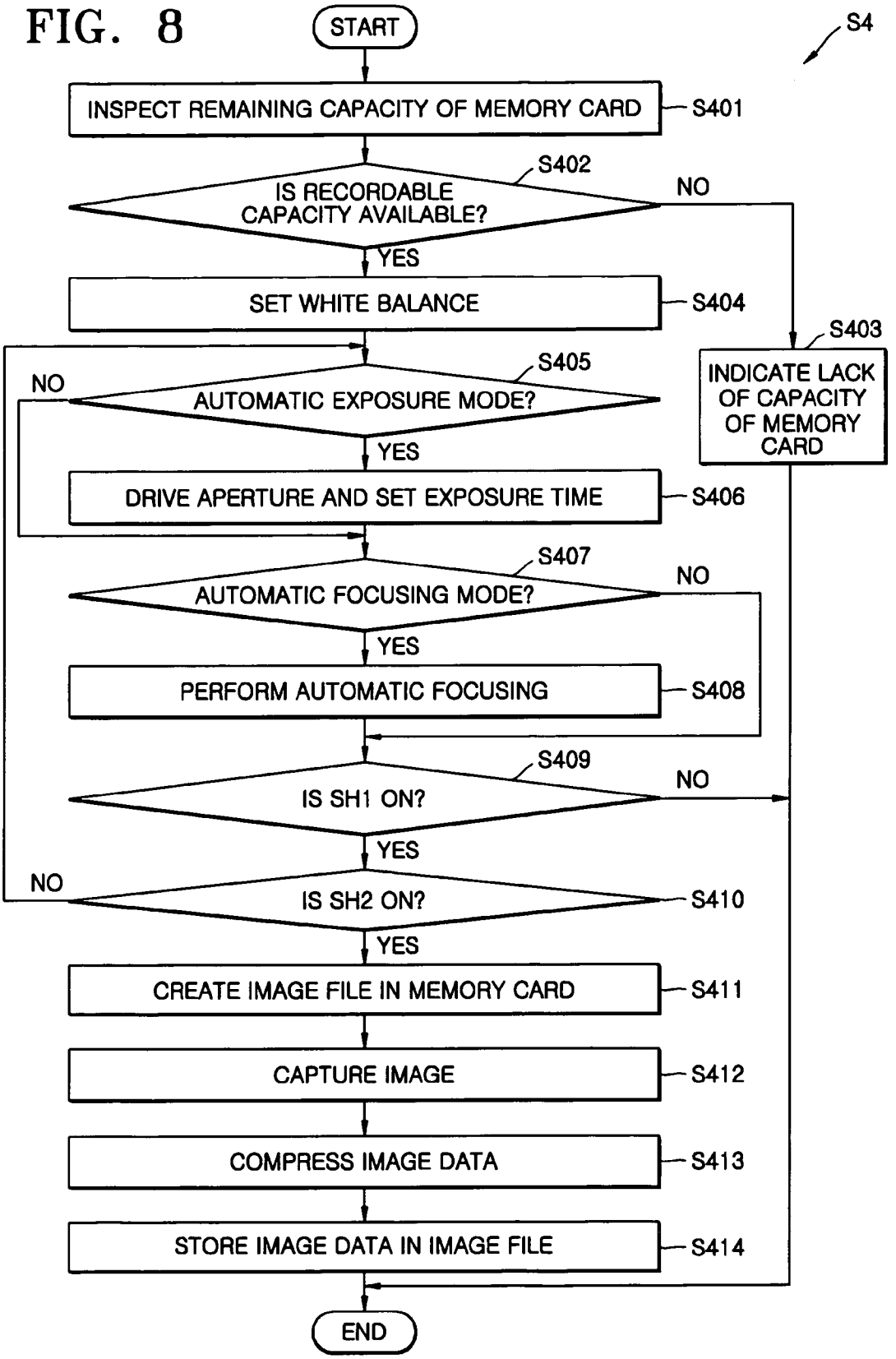

START
S4
INSPECT REMAINING CAPACITY OF MEMORY CARD
S401
S402
IS RECORDABLE CAPACITY AVAILABLE?
NO
YES
SET WHITE BALANCE
S404
S403
INDICATE LACK OF CAPACITY OF MEMORY CARD
S405
NO
AUTOMATIC EXPOSURE MODE?
YES
DRIVE APERTURE AND SET EXPOSURE TIME
S406
S407
AUTOMATIC FOCUSING MODE?
NO
YES
PERFORM AUTOMATIC FOCUSING
S408
S409
IS SH1 ON?
NO
YES
NO
IS SH2 ON?
S410
YES
CREATE IMAGE FILE IN MEMORY CARD
S411
CAPTURE IMAGE
S412
COMPRESS IMAGE DATA
S413
STORE IMAGE DATA IN IMAGE FILE
S414
END

FIG. 9

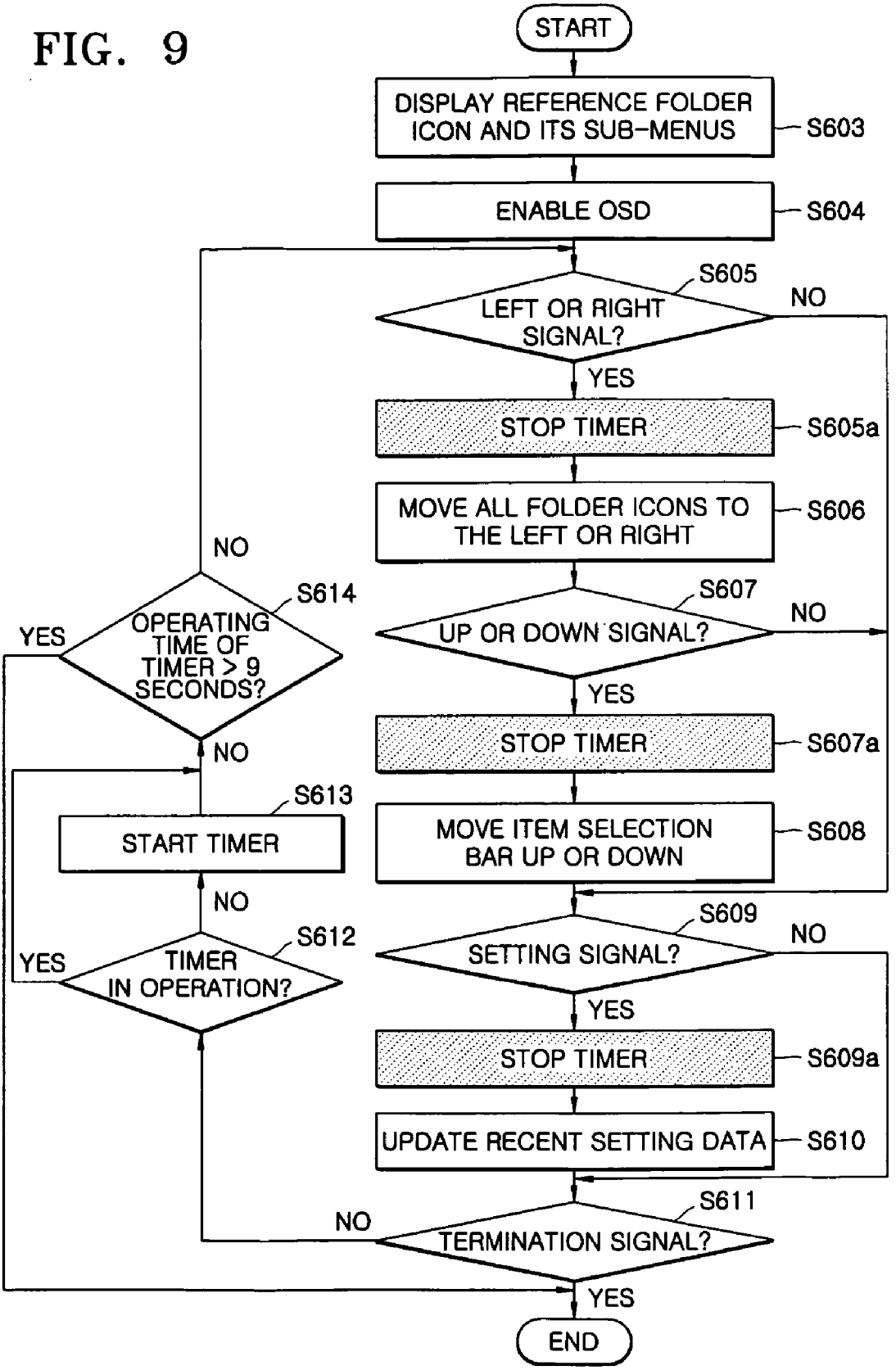

START
DISPLAY REFERENCE FOLDER ICON AND ITS SUB-MENUS
S603
ENABLE OSD
S604
S605
LEFT OR RIGHT SIGNAL?
NO
YES
STOP TIMER
S605a
MOVE ALL FOLDER ICONS TO THE LEFT OR RIGHT
S606
S607
UP OR DOWN SIGNAL?
NO
YES
STOP TIMER
S607a
MOVE ITEM SELECTION BAR UP OR DOWN
S608
S609
SETTING SIGNAL?
NO
YES
STOP TIMER
S609a
UPDATE RECENT SETTING DATA
S610
S611
TERMINATION SIGNAL?
NO
YES
END
NO
S614
OPERATING TIME OF TIMER > 9 SECONDS?
YES
NO
S613
START TIMER
NO
S612
TIMER IN OPERATION?
YES

FIG. 10

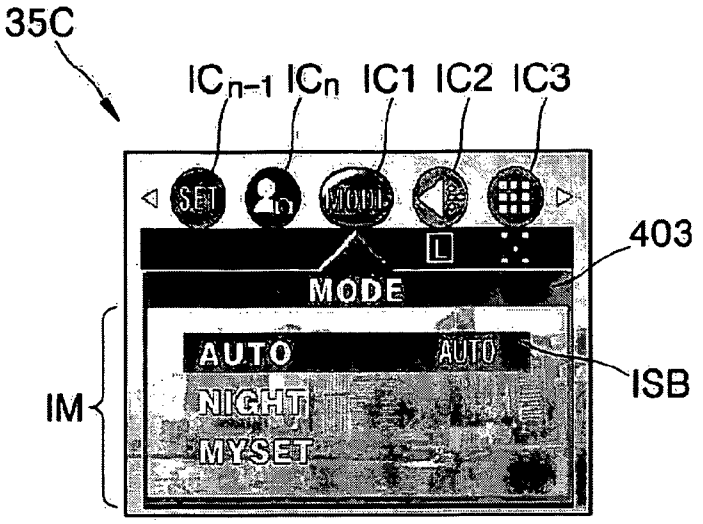

35C
ICn-1 ICn IC1 IC2 IC3
SET
MODE
403
MODE
AUTO
AUTO
NIGHT
MYSET
ISB
IM

FIG. 11

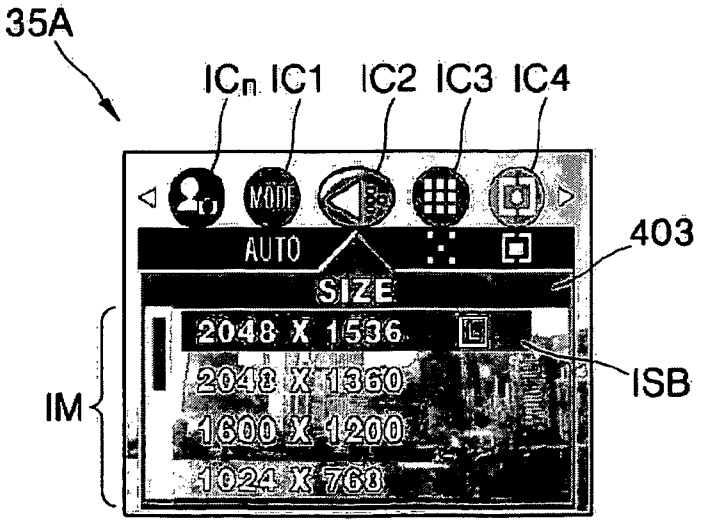
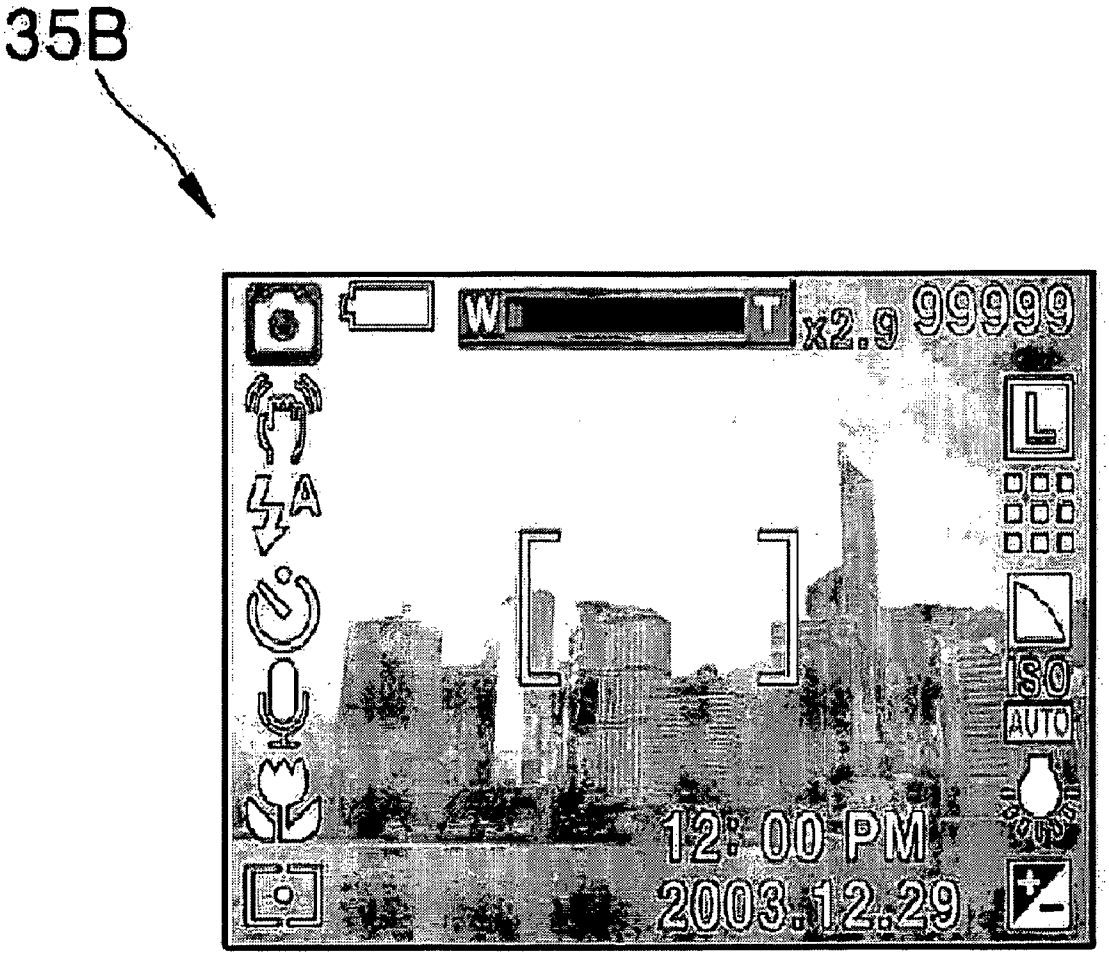

35A
ICn IC1 IC2 IC3 IC4
MODE
403
AUTO
SIZE
2048 X 1536
2048 X 1360
1600 X 1200
1024 X 768
ISB
IM

FIG. 12



DIGITAL PHOTOGRAPHING APPARATUS THAT ADAPTIVELY DISPLAYS ICONS AND METHOD OF CONTROLLING THE DIGITAL PHOTOGRAPHING APPARATUS

BACKGROUND OF THE INVENTION

This application claims the priority of Korean Patent Application No. 10-2004-0094552, filed on Nov. 18, 2004, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

1. Field of the Invention

The present invention relates to a digital photographing apparatus and a method of controlling the same. More particularly, the present invention relates to a digital photographing apparatus that displays a preview image and overlaps the preview image with setting icons indicating set operating conditions of the digital photographing apparatus and a method of controlling the digital photographing apparatus.

2. Description of the Related Art

A conventional digital photographing apparatus is disclosed in U.S. Patent Publication No. 2004/119,876 entitled "Method of Notification of Inadequate Picture Quality." In this disclosure, a preview image that is input through an optical system and setting icons indicating set operating conditions of the digital photographing apparatus are displayed together, with the setting icons overlapping the preview image.

When such a conventional digital photographing apparatus is used, a user has to operate several buttons to terminate the display of the setting icons. Accordingly, for a quick photographing operation, the user has to capture the preview image while it is made unclear by the setting icons since the user cannot quickly remove the setting icons from a screen.

SUMMARY OF THE INVENTION

Various embodiment of the present invention provide a digital photographing apparatus and a method of controlling the same, wherein the apparatus and method minimize inconvenience in a photographing operation caused by displaying setting icons that indicate operating conditions of the digital photographing apparatus.

According to an embodiment of the present invention, there is provided a digital photographing apparatus that (1) displays a preview image and overlaps it with displayed setting icons indicating set operating conditions of the digital photographing apparatus, and (2) stops displaying the setting icons if a user does not generate a signal within a set period of time.

In the method, a user can adjust a set period of time in advance, thereby removing setting icons from a screen at appropriate timing without manipulating additional buttons. Therefore, inconvenience in a photographing operation caused by displaying the setting icons can be minimized.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

FIG. **1** is a perspective view illustrating the front and the top of a digital camera according to an embodiment of the present invention;

FIG. **2** is a perspective view illustrating the back of the digital camera of FIG. **1**;

FIG. **3** is a schematic diagram of the configuration of the digital camera of FIG. **1**;

FIG. **4** is a flowchart illustrating a main program of a digital camera processor (DCP) illustrated in FIG. **3**;

FIG. **5** is a flowchart illustrating an embodiment of the preview mode program of FIG. **4**;

FIG. **6** is a screen on which a preview image and setting icons are displayed and overlap as a result of performing operation S**211** of FIG. **5**;

FIG. **7** is a screen on which the setting icons are no longer displayed as a result of performing operations S**215** and S**216**;

FIG. **8** is a flowchart illustrating an embodiment of the photographing mode program of FIG. **4**;

FIG. **9** is a flowchart illustrating an embodiment of the setting mode program of FIG. **4**;

FIG. **10** is a screen on which folder icons and their submenus overlap a preview image and are displayed as a result of performing operation S**603** of FIG. **9** according to an embodiment of the present invention;

FIG. **11** is a screen showing the folder icons moved to the left or right as a result of performing operation S**606** of FIG. **9**; and

FIG. **12** is screen obtained as a result of terminating the setting mode of FIG. **9** and performing the preview mode.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, the front part of a digital camera **1** according to an embodiment of the present invention includes a self-timer lamp **11**, a flash **12**, a viewfinder **17***a*, a flash-luminance sensor **19**, a lens unit **20**, and a remote receiver **41**. The top of the digital camera **1** includes a microphone MIC, a shutter release button **13**, and a power switch **31**.

In a self-timer mode, the self-timer lamp **11** operates for a set period of time from the time when the shutter release button **13** is pressed to the time when an image starts to be captured. When the flash **12** operates, the flash-luminance sensor **19** senses luminance and relays the sensed luminance to a digital camera processor (DCP) **507** of FIG. **3** via a micro-controller **512** of FIG. **3**. The remote receiver **41** receives command signals, for example, a photographing command signal, from a remote controller (not shown) and relays the photographing command signal to the DCP **507** via the micro-controller **512**.

The shutter release button **13** has two levels. In other words, referring to FIG. **8**, when a user lightly depresses the shutter release button **13** to a first level, a first level signal SH**1** from the shutter release button **13** is turned on. When the user fully depresses the shutter release button **13** to a second level, a second level signal SH**2** from the shutter release button **13** is turned on.

Referring to FIG. **2**, the back of the digital camera **1** according to an embodiment of the present invention includes a mode dial **14**, functional buttons **15**, a manual focus/delete button **36**, a manual adjust/reproduce/terminate button **37**, a reproduction mode button **42**, a speaker SP, a monitor button **32**, an automatic focusing lamp **33**, a viewfinder **17***b*, a flash standby lamp **34**, a color LCD panel **35**, a wide-angle zoom button $\mathbf{39}_W$, a telephoto zoom button $\mathbf{39}_T$, and an external interface unit **21**.

The mode dial **14** is used for selecting the operating modes of the digital camera **1**. For example, a user may select modes such as a simple photographing mode, a program photographing mode, a character photographing mode, a night-view photographing mode, a manual photographing mode, a mov-

ing-image photographing mode, a user-setting mode 14_{MY}, and an audio recording mode 14_V.

The user-setting mode 14_{MY} is an operating mode in which a user selects photograph-taking settings for each photographing mode. Reference numeral 14_{MP} indicates the moving-image photographing mode. The audio recording mode 14_V is for recording only sounds, for example, a user's voice. After selecting the audio recording mode 14_V, when a user presses the shutter release button **13**, an audio file is created in the memory card and audio data is stored in the audio file. When the user presses the shutter release button **13** again, the audio data stops being stored and the audio file is set.

The functional buttons **15** are used for operating specific functions of the digital camera **1**. The functional buttons **15** are also used as control buttons to manage the movement of an active cursor on the menu screen of the color LCD panel **35**.

In a reproduction mode, if an image currently displayed is not enlarged, when the user presses a self-timer/right button 15_R, a next file in a forward direction is displayed. If an image currently displayed is enlarged, when the user presses the self-timer/right button 15_R, a display area of the enlarged image is moved to the right. In a preview mode, if the user presses the self-timer/right button 15_R, a self-timer operation, e.g., automatic photographing after 10 seconds, is performed.

In the reproduction mode, if the image currently displayed is not enlarged, when the user presses a flash/left button 15_L, a next file in a reverse direction is displayed. If the image currently displayed is enlarged, when the user presses the flash/left button 15_L, the display area of the enlarged image is moved to the left. In the preview mode, if the user presses the flash/left button 15_L, any one of the flash modes for a photographing mode is set.

In the reproduction mode, if the image currently displayed is enlarged, when the user presses a macro/down button 15_D, the display area of the enlarged image is moved down. In the preview mode, the user may set automatic proximity focusing by pressing a macro/down button 15_D.

In the reproduction mode, when the image currently displayed is enlarged, if the user presses a voice-memo/up button 15_U, the display area of the enlarged image is moved up. In the preview mode, if the user presses the voice-memo/up button 15_U, a 10 second recording is possible upon consecutive photographing.

In a setting mode, if the user presses a menu/select-confirm button 15_M when the active cursor is on a selection menu, the operation corresponding to the selection menu is performed.

The manual adjust/reproduce/terminate button **37** is used for manual adjustment of specific conditions. In the reproduction mode, when the user presses the manual adjust/reproduce/terminate button **37**, a selected moving-image file may be reproduced or its reproduction may be terminated.

The manual focus/delete button **36** is used for manual focusing or deleting in the photographing mode.

The monitor button **32** is used for controlling the operation of the color LCD panel **35**. For example, in the photographing mode, when the user presses the monitor button **32**, an image and photographing information are displayed on the color LCD panel **35**. When the user presses the monitor button **32** again, the color LCD panel **35** is turned off. In the reproduction mode, when the user presses the monitor button **32** while an image file is being reproduced, photographing information about the image file is displayed on the color LCD panel **35**. When the user presses the monitor button **32** again, only images are displayed.

The reproduction mode button **42** is used for switching between the reproduction mode and the preview mode.

The automatic focusing lamp **33** operates when automatic focusing is completed. The flash standby lamp **34** operates when the flash **12** of FIG. **1** is in a standby mode. A mode indicating lamp 14_L indicates a selection mode of the mode dial **14**.

FIG. **3** is a schematic diagram of the configuration of the digital camera **1** of FIG. **1**. The configuration and operation of the digital camera **1** of FIG. **1** will now be described with reference to FIGS. **1** through **3**.

An optical system (OPS) including the lens unit **20** and a filter unit optically processes light. The lens unit **20** of the OPS includes a zoom lens, a focal lens, and a compensation lens.

When the user presses the wide-angle zoom button 39_W or the telephoto zoom button 39_T included in a user input portion (INP), a signal corresponding to the wide-angle zoom button 39_W or the telephoto zoom button 39_T is relayed to the micro-controller **512**. The micro-controller **512** controls a driver **510**, thereby running a zoom motor M_Z, which, in turn, moves the zoom lens. In other words, when the user presses the wide-angle zoom button 39_W, the focus length of the zoom lens becomes short, thereby widening the angle of view. When the user presses the telephoto zoom button 39_T, the focus length of the zoom lens becomes long, thereby narrowing the angle of view. Since the position of the focus lens is adjusted in a state where the position of the zoom lens is set, the angle of view is hardly affected by the position of the focus lens.

In the automatic focusing mode, a main controller built into the DCP **507** controls the driver **510** through the micro-controller **512**, thereby driving a focus motor M_F. Accordingly, when the focus lens is moved, the position of the focus lens, for example, a number of driving steps of the focus motor M_F, having a largest high frequency component of an image signal is set.

The compensation lens in the lens unit **20** of the OPS is not separately operated because the compensation lens compensates for the entire refractive index. Reference numeral M_A indicates a motor for driving an aperture (not shown).

An optical low pass filter included in the filter unit of the OPS eliminates high frequency optical noise. An infrared cut filter included in the filter unit of the OPS blocks the infrared component of incident light.

A photoelectric conversion unit (OEC) of a charge coupled device or a complementary metal oxide (CMOS) semiconductor converts light from the OPS into an analog electrical signal. Here, the DCP **507** controls a timing circuit **502** to control the operations of the OEC and a correlation-double-sampler-and-analog-to-digital converter (CDS-ADC) **501**. The CDS-ADC **501** processes the analog signal from the OEC, eliminates high frequency noise, adjusts amplitude, and then converts the analog signal into a digital signal.

A real time clock (RTC) **503** provides time information to the DCP **507**. The DCP **507** processes the digital signal from the CDS-ADC **501** and generates a digital image composed of luminance and chromaticity values.

A light emitting portion (LAMP) is operated by the micro-controller **512** in response to a control signal generated by the DCP **507** including the main controller. The light emitting portion (LAMP) includes the self-timer lamp **11**, the automatic focusing lamp **33**, the mode indicating lamp 14_L, and the flash standby lamp **34**. The user input portion INP includes the shutter release button **13**, the mode dial **14**, the functional buttons **15**, the monitor button **32**, the manual focus/delete button **36**, the manual adjust/reproduce/terminate button **37**, the reproduction mode button **42**, the wide-angle zoom button 39_W, and the telephoto zoom button 39_T.

A dynamic random-access memory (DRAM) **504** temporarily stores a digital image signal from the DCP **507**. An electrically erasable and programmable read-only memory (EEPROM) **505** stores programs and setting data. A user's memory card is inserted into or removed from a memory card interface **506**. The digital image signal from the DCP **507** is input to an LCD driver **514**, thereby displaying an image on the color LCD panel **35**.

The digital image signal from the DCP **507** can be transmitted as serial communications via a universal serial bus (USB) connector **21***a* or via an RS232C interface **508** and an RS232C connector **21***b*. The digital image signal from the DCP **507** can also be transmitted as a video signal via a video filter **509** and a video output unit **21***c*.

An audio processor **513** can relay sound from the microphone MIC to the DCP **507** or to the speaker SP. In addition, the audio processor **513** can output an audio signal from the DCP **507** to the speaker SP. The micro-controller **512** controls the operation of a flash controller **511** in response to a signal from the flash-luminance sensor **19**, thereby driving the flash **12**.

A main program of the DCP **507** of FIG. **3** will be now described with reference to FIGS. **1** through **4**.

When power is applied to the digital camera **1**, the DCP **507** is initialized (S**1**). After the initialization (S**1**), the DCP **507** performs a preview mode (S**2**). In the preview mode, a preview image input through the OPS and setting icons indicating set operating conditions of the digital camera **1** are displayed on the color LCD panel **35** (see FIG. **6**).

Also, in the preview mode (S**2**), the DCP **507** drives an internal timer if the internal timer is not on. If the operating time of the internal timer exceeds a set period of time, for example, 9 seconds, the setting icons are no longer displayed since the user did not generate a signal within the set period of time. Thus, by adjusting the set period of time in advance, the user can set the digital camera **1** to cease displaying the setting icons on the display screen at appropriate timing without pressing an additional button such as the monitor button **32**. Accordingly, inconvenience in a photographing operation caused by displaying the setting icons can be minimized. An operation related to the preview mode will be described in detail later with reference to FIG. **5**.

When the user lightly depresses the shutter release button **13** to the first level and the first level signal SH**1** from the shutter release button **13** is turned on (S**3**), the timer that started in the preview mode (S**2**) or a setting mode (S**6**) stops (S**3***a*) because the timer must be driven again in the preview mode (S**2**) or the setting mode (S**6**) if the user generated a signal. The DCP **507** performs a current photographing mode (S**4**). The photographing mode (S**4**) program will be described in detail with reference to FIG. **8**.

When a setting signal for setting operating conditions of the digital camera **1** is generated by the user input portion INP (S**5**), the timer that started in the preview mode (S**2**) or the setting mode (S**6**) stops (S**5***a*) because the timer must be driven again in the preview mode (S**2**) or the setting mode (S**6**) if the user generated a signal.

The setting mode for setting the operating conditions of the digital camera **1** is performed in response to signals received from the user input portion INP (S**6**). In the setting mode, folder icons and their sub-menus for setting operating conditions of the digital camera **1** overlap the preview image and are displayed on the color LCD panel **35** (see FIGS. **10** and **11**).

Also, in the setting mode (S**6**), the DCP **507** drives the internal timer if the internal timer is not on. If the operating time of the internal timer exceeds a set period of time, for example, 9 seconds, the DCP **507** terminates the setting mode (S**6**) and performs a next operation (S**8**) because the user has not generated a signal during the set period of time. In this case, the folder icons and their sub-menus are no longer displayed. Thus, by adjusting the set period of time in advance, the user can remove the folder icons and their sub-menus from the screen at an appropriate time without pressing an additional button such as the menu/select-confirm button $\mathbf{15}_M$. Accordingly, inconvenience in the photographing operation caused by displaying the folder icons and their sub-menus in the user-setting mode (S**6**) can be minimized. An operation related to the setting mode will be described in detail later with reference to FIG. **9**.

Considering that operation S**5** can be performed after operation S**6** is terminated, it can be understood that when the user presses a setting button and thus generates a signal, folder icons and their sub-menus corresponding to the setting button are displayed.

When a termination signal is not generated, the DCP **507** continues to perform the following operations (S**7**).

When a signal is generated by the reproduction mode button **42** in the user input portion INP (S**8**), the timer that started in the preview mode (S**2**) or the setting mode (S**6**) stops (S**8***a*) because the timer must be driven again in the preview mode (S**2**) or the setting mode (S**6**) if the user generated a signal. In the reproduction mode, the DCP **507** performs a reproduction operation in response to the signals received from the user input portion INP. When the reproduction mode is terminated, the above operations are repeated.

The preview mode (S**2**) program will now be described with reference to FIGS. **1** through **3** and FIG. **5**.

The DCP **507** performs automatic white balancing (AWB) and sets parameters related to the white balance (S**201**). The DCP **507** performs automatic exposure (S**202**). The DCP **507** calculates the exposure by measuring incident luminance, drives the aperture driving motor M_A according to the calculated exposure, and sets a shutter speed. Then, the DCP **507** performs automatic focusing (S**203**).

The DCP **507** performs gamma correction on input image data (S**204**) and scales the gamma corrected image data to meet display standards (S**205**). The DCP **507** converts the scaled input image data from an RGB (red, green, and blue) format into a luminance-chromaticity format (S**206**). The DCP **507** processes the input image data depending on resolution and where the input image data is displayed and filters the input image data (S**207**).

The DCP **507** temporarily stores the input image data in the DRAM **504** of FIG. **3** (S**208**). The DCP **507** synthesizes the data temporarily stored in the DRAM **504** of FIG. **3** and on-screen display (OSD) data (S**209**). The OSD data denote data of the setting icons indicating operating conditions of the digital camera **1**. The DCP **507** converts the synthesized image data from the RGB format into the luminance-chromaticity format (S**210**) and outputs the image data in the converted format via the LCD driver **514** of FIG. **3** (S**211**, see FIG. **6**).

The DCP **507** drives the internal timer if the internal timer is not on (S**212** and S**213**). If the internal timer is not driving and the digital camera **1** performs the preview mode (S**2**) right after being turned on, the timer is stopped in any one of operations S**3***a*, S**5***a* and S**8***a* of FIG. **4** and operations S**605***a*, S**607***a* and S**609***a* of FIG. **9**. Here, operations S**212** and S**213** may be performed just before operation S**201**.

If the operating time of the internal timer exceeds the set period of time, for example, 9 seconds, the DCP **507** disables the output of the OSD data and deletes the OSD data stored in a frame memory (S**214** through S**216**, see FIG. **7**). When the

user presses a particular button after the OSD data is deleted in operations S214 through S216, the DCP 507 can redisplay the OSD data that has recently been deleted.

FIG. 6 is a screen on which a preview image and the setting icons overlap and are displayed as a result of performing operation S211 of FIG. 5. FIG. 7 is a screen on which the setting icons are no longer displayed as a result of performing operations S215 and S216.

Referring to FIGS. 6 and 7, reference numeral 35 indicates the color LCD panel and reference numeral I_F indicates a setting icon. If the operating time of the internal timer exceeds a set period of time, for example, 9 seconds, the setting icons are no longer displayed since the user did not generate a signal within the set period of time. Thus, by adjusting the set period of time in advance, the user can remove the setting icons from a screen at appropriate timing without pressing additional button, for example, the monitor button 32. Accordingly, inconvenience in a photographing operation caused by displaying the setting icons can be minimized.

FIG. 8 is a flowchart illustrating an embodiment of the photographing mode (S4) program of FIG. 4. The photographing mode (S4) program of FIG. 4 will now be described with reference to FIGS. 1 through 3 and 8. Here, the current position of the zoom lens is already set.

The DCP 507 inspects the remaining capacity of the memory card (S401) and determines whether the memory card has enough capacity to store a digital image signal (S402). If the memory card does not have enough storage capacity, the DCP 507 indicates the lack of capacity of the memory card and ends the photographing mode (S403). If the memory card has enough storage capacity, the following operations are performed.

The DCP 507 sets white balance and parameters related to the white balance according to a present photographing condition (S404). In the automatic exposure mode (S405), the DCP 507 calculates the exposure by measuring incident luminance, drives the aperture driving motor M_A according to the calculated exposure, and sets exposure time (S406). In the automatic focusing mode (S407), the DCP 507 performs automatic focusing and drives the focal lens (S408).

When the first level signal SH1 from the shutter release button 13 is on (S409), the DCP 507 performs the following operations.

The DCP 507 identifies whether the second level signal SH2 is on (S410). When the second level signal SH2 is not on, it means that the user did not press the shutter release button 13 to the second level to take a photograph. Then, the DCP 507 repeats S405 through S410.

When the second level signal SH2 is on, it means that the user fully depressed the shutter release button 13 to the second level. Then, the DCP 507 creates an image file in the memory card (S411). Next, the DCP 507 captures an image (S412). In other words, the DCP 507 receives still-image data from the CDS-ADC 501. Then, the DCP 507 compresses the received still-image data (S413). The DCP 507 stores the compressed still-image data in the image file (S414).

FIG. 9 is a flowchart illustrating an embodiment of the setting mode (S6) program of FIG. 4. FIG. 10 is a screen on which folder icons IC1 through IC_n and their sub-menus overlap a preview image and are displayed as a result of performing operation S603 of FIG. 9 according to an embodiment of the present invention. FIG. 11 is a screen showing the folder icons IC1 through IC_n moved to the left or right as a result of performing operation S606 of FIG. 9. FIG. 12 is screen obtained as a result of terminating the setting mode (S6) of FIG. 9 and performing the preview mode (S2 of FIG. 4).

Referring to FIGS. 10 through 12, reference numerals 35A through 35C indicate display screens of the color LCD panel 35 of FIG. 1, reference numerals IC1 through IC_n indicate folder icons for setting operating conditions of the digital camera 1, reference numeral 403 indicates folder names, IM indicates specific items as sub-menus of each folder, and ISB indicates an item selection bar. The setting mode (S6) program of FIG. 4 will now be described with reference to FIGS. 1 through 3 and 9 through 12.

The DCP 507 controls the LCD driver 514 to display a reference folder icon IC1 of FIG. 10 and its sub-menu of FIG. 10 on the color LCD panel 35 (S603, see FIG. 10). If OSD is set for each reference folder icon, the OSD is enabled (S604).

If a left signal or a right signal is input from the user input portion INP via the micro-controller 512 (S605), the DCP 507 terminates the operation of the internal timer if the internal timer is driving (S605*a*) because the internal timer must be driven again in the preview mode (S2) or the setting mode (S6) if the user generated a signal. The DCP 507 moves all the folder icons IC1 through IC_n to the left or right (S606). In this process, the folder name 403 of an activated folder icon and the specific items IM as the sub-menus of the activated folder icon are displayed. In addition, the item selection bar ISB is displayed on a recent setting item out of the displayed specific items IM (see FIG. 11).

If an up signal or a down signal is input from the user input portion INP via the micro-controller 512 (S607), the DCP 507 terminates the operation of the internal timer if the internal timer is driving (S607*a*) because the internal timer must be driven again in the preview mode (S2) or the setting mode (S6) if the user generated a signal. The DCP 507 moves the item selection bar ISB up or down (S608).

If a setting signal is input from the user input portion INP via the micro-controller 512 (S609), the DCP 507 terminates the operation of the internal timer if the internal timer is driving (S609*a*) because the internal timer must be driven again in the preview mode (S2) or the setting mode (S6) if the user generated a signal. The DCP 507 updates recent setting data as data that overlaps the item selection bar ISB (S610).

When the termination signal is generated by the user, the DCP 507 terminates the setting mode (S611). Accordingly, the folder icons IC1 through IC_n and their sub-menus are no longer displayed (compare FIGS. 11 and 12). When the termination signal is not generated, the DCP 507 continues to perform the following operations.

The DCP 507 drives the internal timer if the internal timer is not on (S612 and S613). If the internal timer is not driving and the digital camera 1 performs the preview mode (S2) right after being turned on, the internal timer is stopped in any one of operations S3*a*, S5*a* and S8*a* of FIG. 4 and operations S605*a*, S607*a* and S609*a* of FIG. 9.

If the operating time of the internal timer does not exceed a set period of time, for example, 9 seconds (S614), the DCP 507 repeats operation S605 and its subsequent operations.

Conversely, if the operating time of the internal timer exceeds the set period of time, for example, 9 seconds, the DCP 507 terminates the setting mode (S614). In other words, the folder icons IC1 through IC_n and their sub-menus are no longer displayed (compare FIGS. 11 and 12). Thus, by adjusting the set period of time in advance, the user can remove the folder icons and their sub-menus from the screen at appropriate timing without pressing additional button, for example, the menu/select-confirm button 15_M. Accordingly, inconvenience in the photographing operation caused by displaying the folder icons and their sub-menus in the user-setting mode (S6) can be minimized.

When the user presses a particular button after the folder icons IC1 through IC_n and their sub-menus are deleted from the screen after the termination of the setting mode (S6), the DCP **507** can redisplay the folder icons IC1 through IC_n and their sub-menus that have recently been deleted. In addition, the user may determine whether to use such an automatic icon hiding function.

As described above, according to a digital photographing apparatus and a method of controlling the same, a user can adjust a set period of time in advance, thereby removing setting icons from a screen at appropriate timing without manipulating additional buttons. Therefore, inconvenience in a photographing operation caused by displaying the setting icons can be minimized.

While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

What is claimed is:

1. A digital photographing apparatus, the apparatus comprising:

an optical system having a lens unit that receives light from a subject to be photographed by the apparatus;

a display screen;

a user input portion; and

a digital processor for controlling what is displayed on the display screen,

wherein the display screen displays a preview image that is obtained through the optical system along with setting icons in a preview mode, and wherein the display screen ceases to display all the setting icons while continuing to display the preview image that is obtained through the optical system if the digital processor does not receive a signal generated by the user input portion within a set period of time;

wherein OSD data stored in a frame memory is deleted while continuing to display the preview image that is obtained through the optical system if the digital processor does not receive the signal generated by the user input portion within the set period of time.

2. The apparatus of claim **1**, further comprising:

a photoelectric device that converts the received light to analog electrical signals;

an analog-to-digital conversion unit that receives the analog electrical signals and converts them to digital signals, wherein the digital processor receives and processes the digital signals; and

a storage medium for storing a file containing a photographed image.

3. The apparatus of claim **1**, wherein the set period of time is preset by a user.

4. The apparatus of claim **1**, wherein the setting icons are displayed overlapping the preview image.

5. The apparatus of claim **1**, wherein the user input portion comprises a button.

6. The apparatus of claim **1**, wherein if less than all of the setting icons are displayed at one time, a display position for each displayed member of the setting icons is shifted in order to allow for displaying a currently undisplayed member of the setting icons.

7. The apparatus of claim **6**, wherein the display positions of the displayed members of the setting icons are shifted to the right if the digital processor receives a right shift signal.

8. The apparatus of claim **6**, wherein the display positions of the displayed members of the setting icons are shifted to the left if the digital processor receives a left shift signal.

9. The apparatus of claim **1**, wherein the setting icons are for setting operating conditions of the apparatus.

10. The apparatus of claim **1**, wherein if less than all of the plurality of icons are displayed at one time, a display position for each displayed member of the plurality of setting icons is shifted in order to allow for displaying a currently un-displayed member of the plurality of setting icons, and the shifting of the icons terminates a timer associated with the set period of time.

11. A method of controlling a digital photographing apparatus during a preview mode, the method comprising:

displaying both a preview image that is obtained through an optical system and setting icons on a display screen;

determining how long the setting icons have been displayed; and

detecting whether a signal is inputted from a user input portion or not; and

ceasing to display all the setting icons while continuing to display the preview image that is obtained through the optical system if the signal is not detected within a set period of time;

wherein OSD data stored in a frame memory is deleted while continuing to display the preview image that is obtained through the optical system if the digital processor does not receive the signal generated by the user input portion within the set period of time.

12. The method of claim **11**, wherein the setting icons are displayed such that the setting icons overlap the preview image.

13. The method of claim **11**, wherein the set period of time is preset by a user.

14. The method of claim **11**, further comprising:

detecting a photographing signal from the user input portion, and in response thereto, entering a photographing mode in which the digital photographing apparatus stores a file containing a photographed image; and

detecting a setting signal from the user input portion, and in response thereto, entering a setting mode in which the operating conditions of the digital photographing apparatus may be set.

15. The method of claim **14**, wherein in the setting mode, a folder icon for setting the operating conditions of the digital photographing apparatus and its sub-menu are displayed such that the folder icon and its sub-menu overlap the preview image.

16. The method of claim **15**, wherein the folder icon and its sub-menu are no longer displayed after the termination of the setting mode.

17. The method of claim **16**, wherein when a setting button is pressed by a user and a signal is generated after the termination of the setting mode, the folder icon and its sub-menu are displayed, wherein the sub-menu corresponds to the setting button.

18. The method of claim **14**, wherein the setting mode is terminated if a second setting signal is not detected within the set period of time.

19. The method of claim **11**, wherein the setting icons are for setting operating conditions of the apparatus.

20. A digital photographing apparatus, the apparatus comprising:

means for receiving light from a subject to be photographed by the apparatus;

means for displaying both a preview image that is obtained through the means for receiving light and setting icons in a preview mode;

means for detecting a user input;

means for determining when a set period of time has expired; and

means for ceasing the display of all the setting icons while continuing to display the preview image that is obtained through the means for receiving light when the set period of time has expired;

wherein OSD data stored in a frame memory is deleted while continuing to display the preview image that is obtained through the optical system if the digital processor does not receive the signal generated by the user input portion within the set period of time.

21. The apparatus of claim **20**, the apparatus further comprising:

means for converting received light to digital signals;

means for processing the digital signals; and

means for storing an image file.

22. The apparatus of claim **20**, wherein the setting icons are for setting operating conditions of the apparatus.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,649,563 B2
APPLICATION NO. : 11/089740
DATED : January 19, 2010
INVENTOR(S) : Seung-yun Lee

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

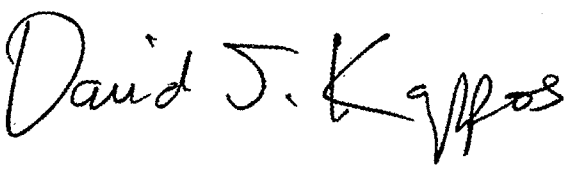
On the Title Page:

The first or sole Notice should read --

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 901 days.

Signed and Sealed this

Twenty-eighth Day of December, 2010



David J. Kappos
Director of the United States Patent and Trademark Office